



Budd Inlet Dissolved Oxygen Cleanup Plan

Ben Watson

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Fall 2022

Topics

- 1 *Background*
- 2 Pollution Sources
- 3 Recommendations and Next Steps



The TMDL Process in Washington

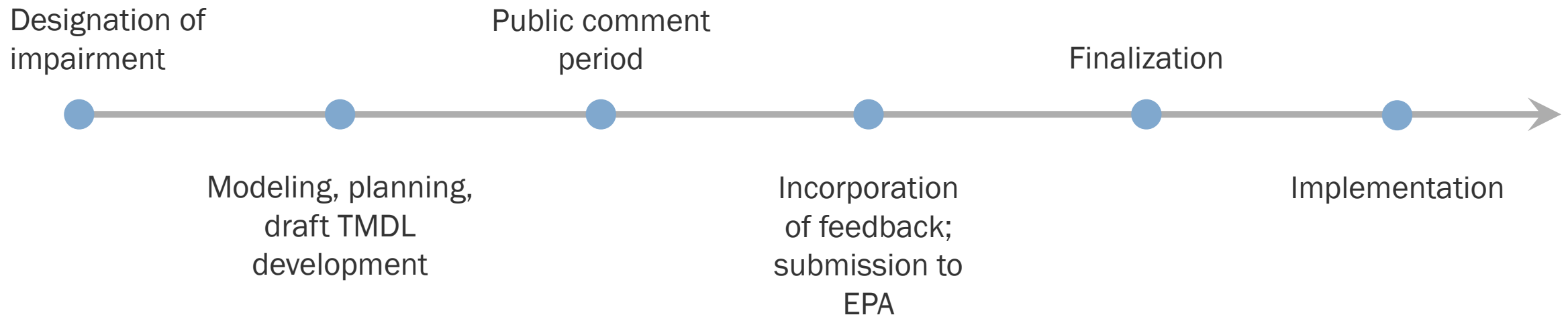
What is a TMDL?

- Total Maximum Daily Load – the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards
- Or: a cleanup plan based on the amount of pollution that needs to be reduced
- Terms and process date back to the Clean Water Act (1973)



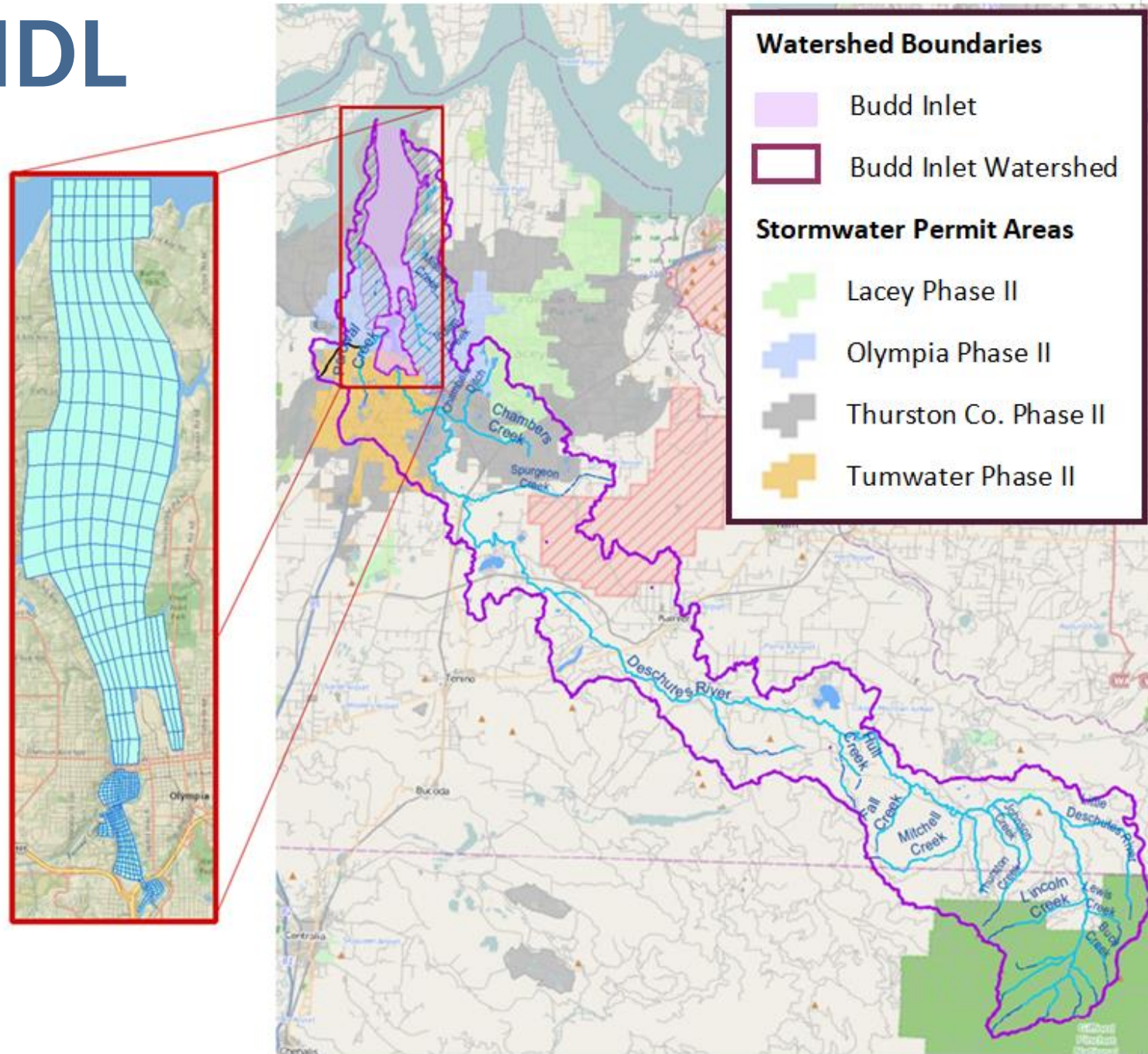
The TMDL Process in Washington

- EPA grants WA the authority to develop TMDLs within its waterways
- Final TMDLs require review and approval from EPA and tribes



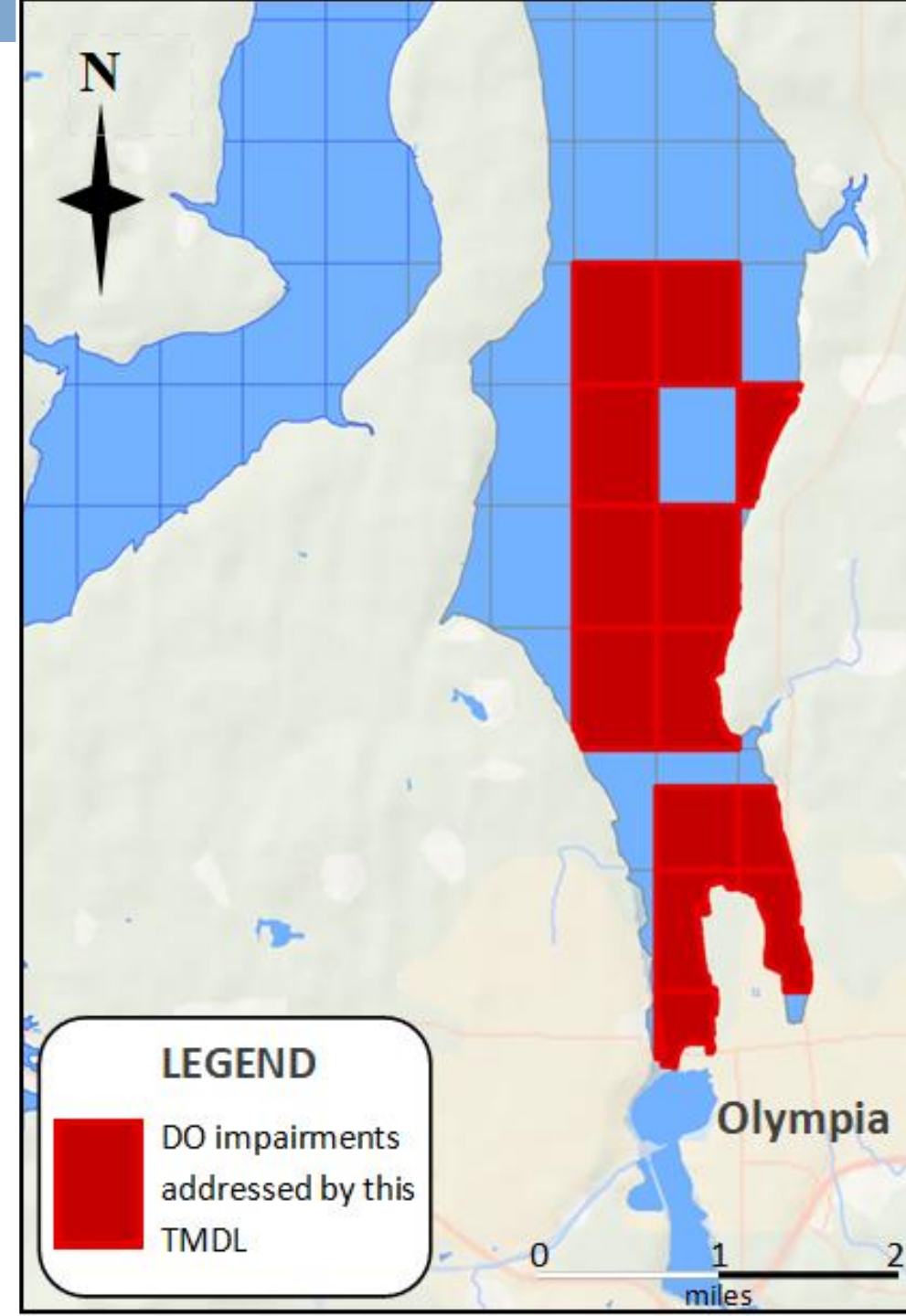
The Budd Inlet TMDL

- At far right, the location of Budd Inlet at the mouth of the Deschutes River
- At right, a close-up of Budd Inlet and Capitol Lake



The Budd Inlet TMDL

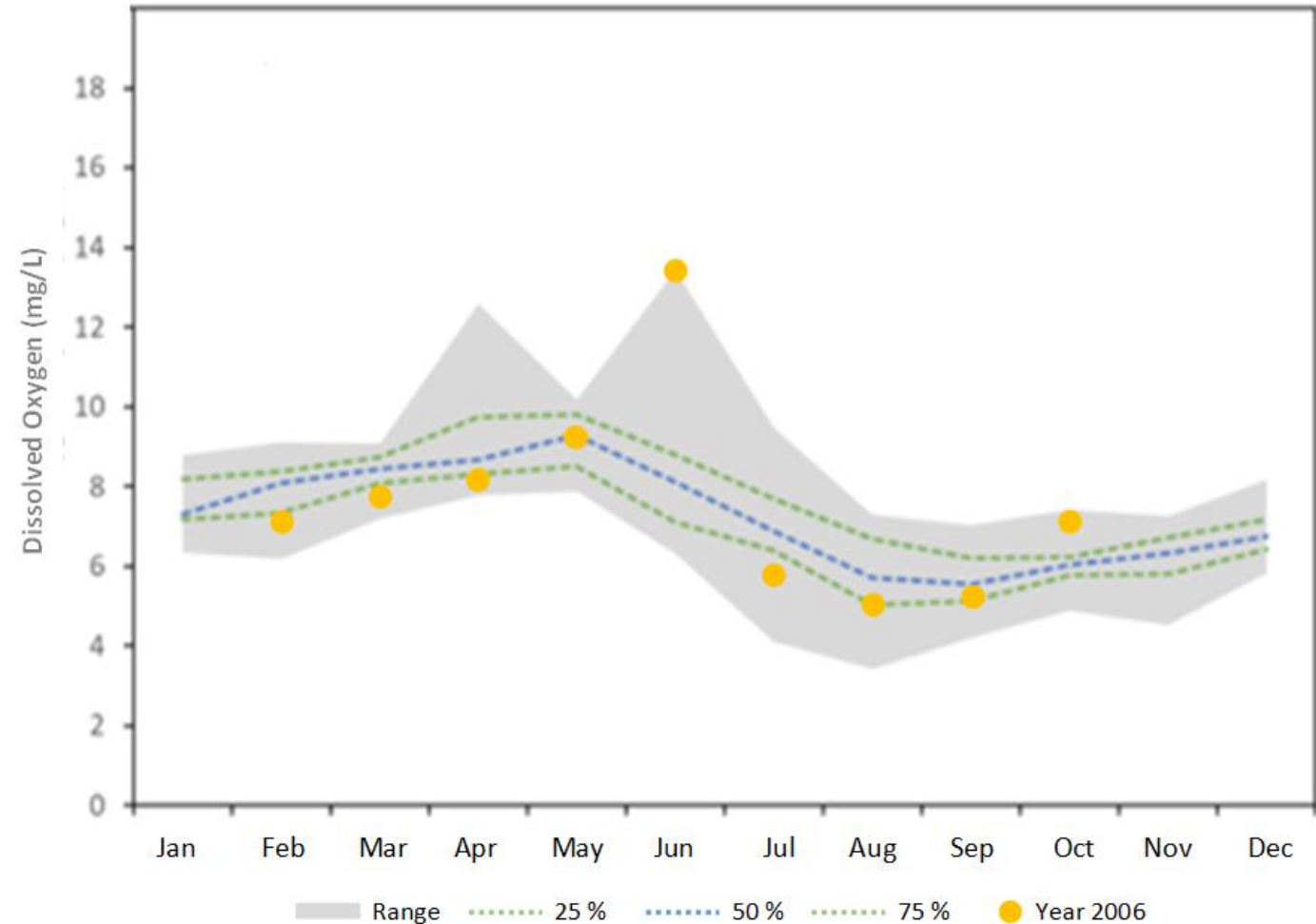
- This Cleanup Plan addresses 13 impairments for dissolved oxygen (DO), shown at right.
- Dissolved oxygen is a critical part of a healthy aquatic ecosystem
- Too many nutrients in a waterbody can cause algae and aquatic plants to grow at excessive rates
- When they decompose, it removes oxygen from the water, creating low-DO conditions and robbing fish and aquatic life of the oxygen they need to breathe.



The Budd Inlet TMDL

- DO levels in Budd Inlet vary by season
- DO levels are lowest in late summer and early fall (typically Aug and Sept), often called the *critical period*
- The timing and extent of the annual DO-minimum is influenced by nutrient pollution during and *before* the critical period occurs
- This seasonality informed our TMDL development

Seasonal Patterns of Dissolved Oxygen in Budd Inlet



Topics

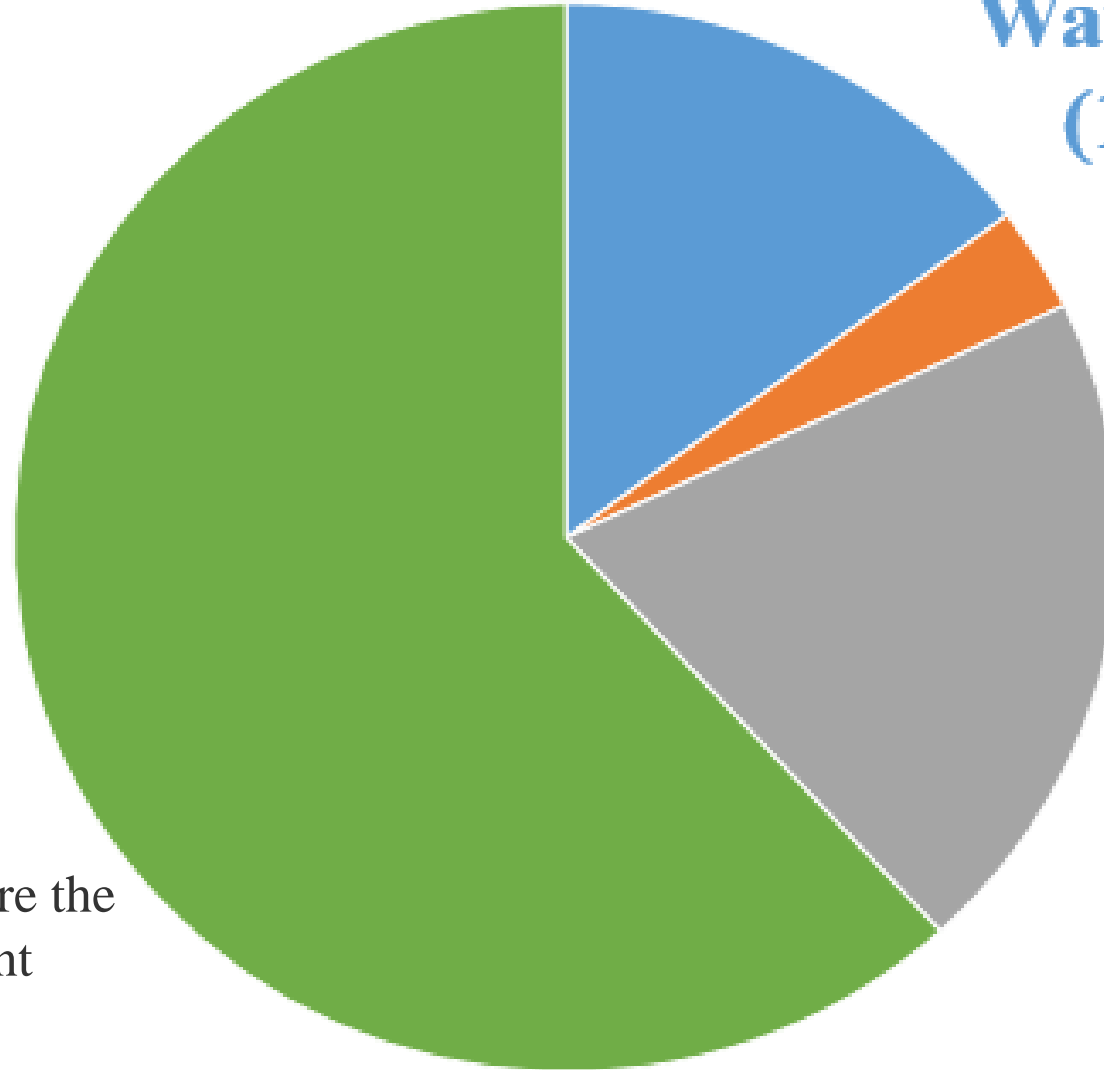
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- 2 *Pollution Sources*
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Sources of DO Depletion

- At right, averaged sources of dissolved oxygen depletion for impaired areas of Budd Inlet.

**Capitol
Lake
(62%)**



**Deschutes
Watershed
(15%)**

**Local
WWTPs
(3%)**

**Greater
Puget Sound
(20%)**

- Budd Inlet is *dynamic*, and so are the relative contributions of different sources of DO-depletion

Capitol Lake

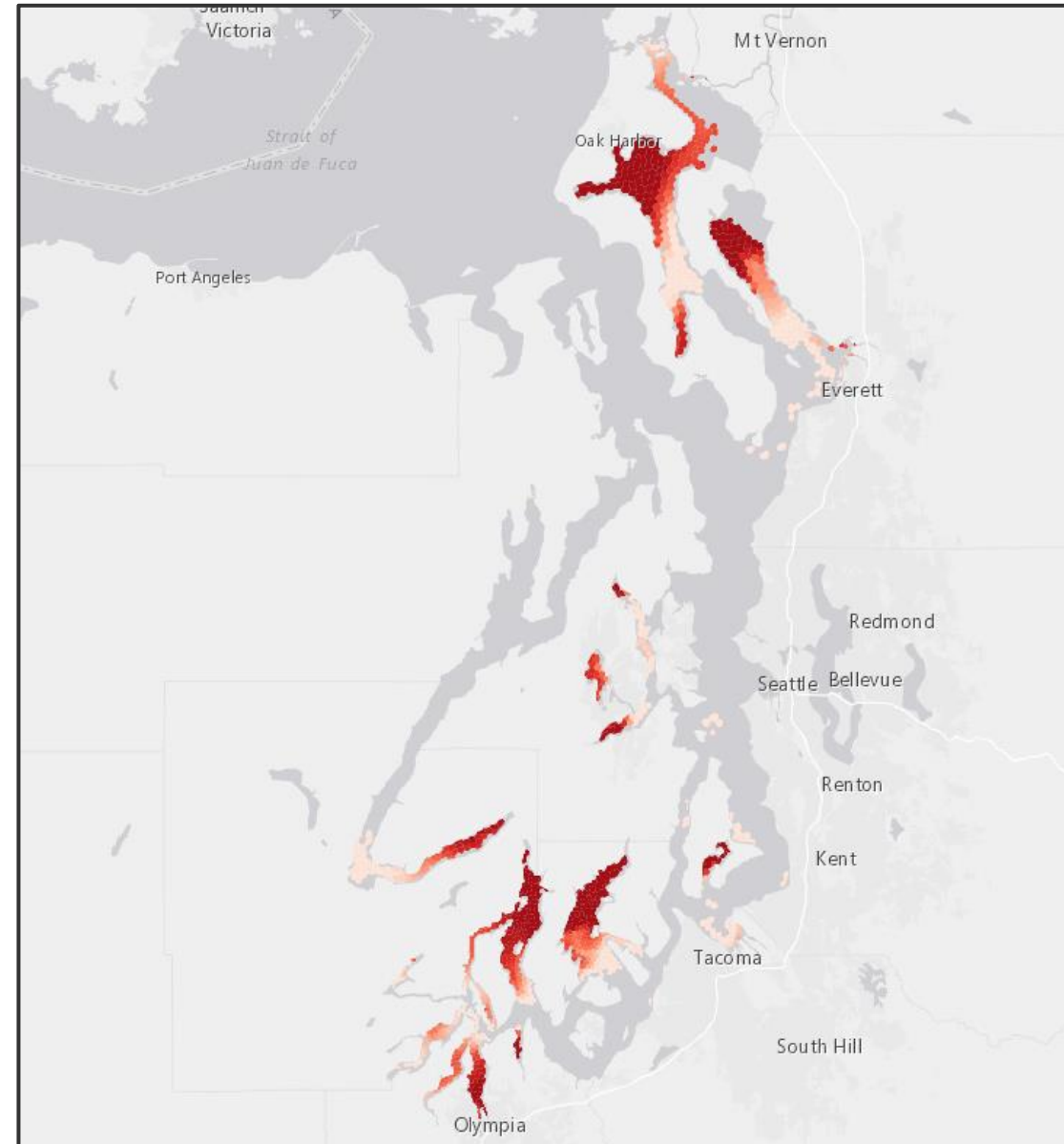


- Dissolved oxygen is most heavily influenced by Capitol Lake
- The lake stimulates the growth of freshwater algae and aquatic plants, which die when flushed into the brackish waters of Budd Inlet
- The resulting decomposition drives DO-depletion
- The dam changes flow patterns within the Inlet, causing localized areas of low circulation
 - In effect, these create long-term eddies that act as localized dead zones

High above Capitol Lake and downtown Olympia (foreground), looking north toward Budd Inlet.

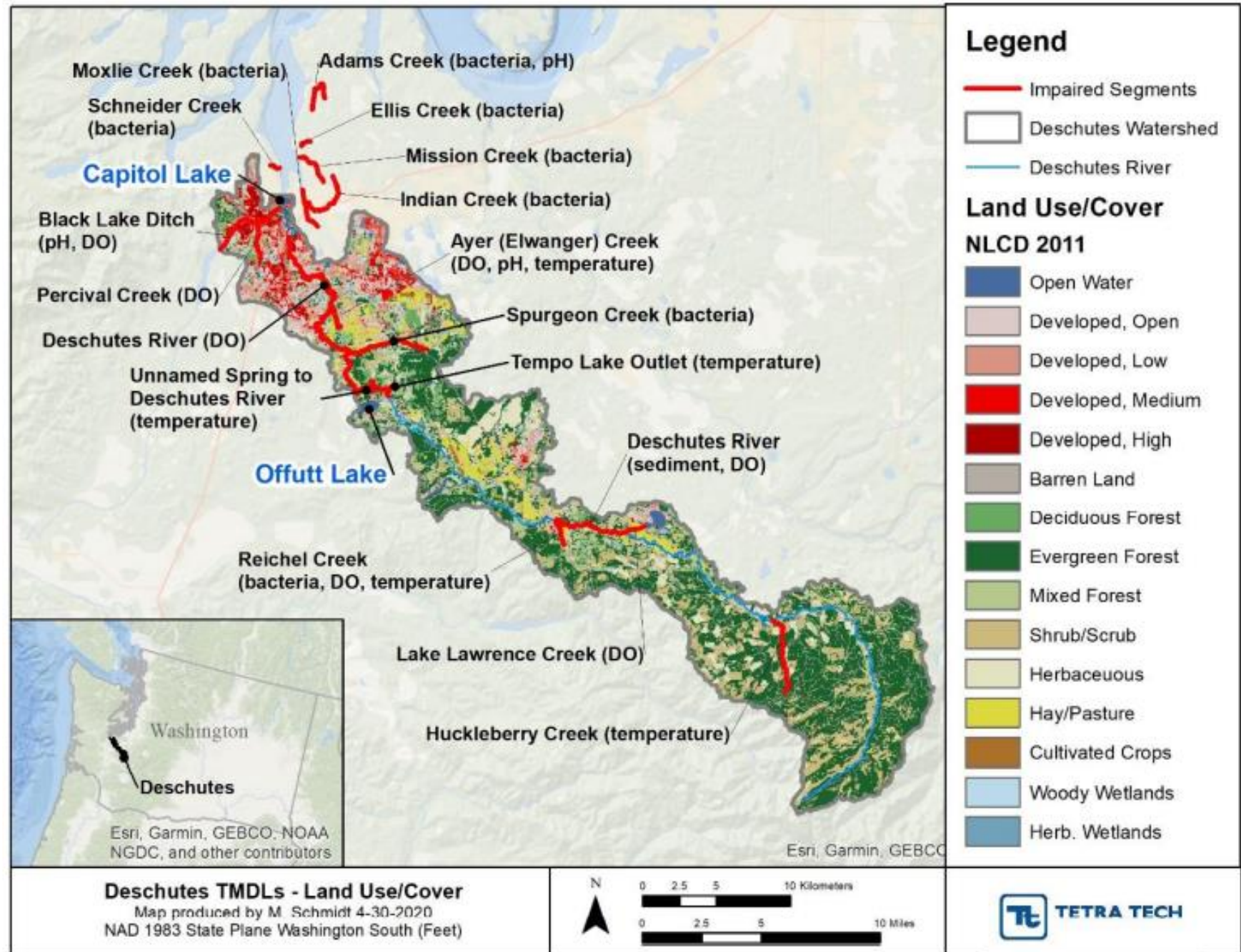
Puget Sound

- Budd Inlet is one of many terminal inlet habitats that are noncompliant for dissolved oxygen, nutrients, or other parameters (shown at right).
- Associated environmental issues include algae blooms and jellyfish smacks.
- The ***Puget Sound Nutrient Source Reduction Project*** and Nutrient General Permit will address nutrient pollution around the Greater Puget Sound watershed.
- This project is scheduled to be completed by 2024.
- The Budd Inlet TMDL relies upon the completion of PSNSRP, and vice versa.



Deschutes River

- At right, the impairment status of the Deschutes River and tributaries, and watershed land cover (EPA, 2021).
- The bulk of the watershed lies within unincorporated parts of Thurston County (roughly between Ayer and Huckleberry Creeks).
- The TMDLs address temperature, bacteria, sediment, pH, and dissolved oxygen (DO) in the Deschutes and tributaries.



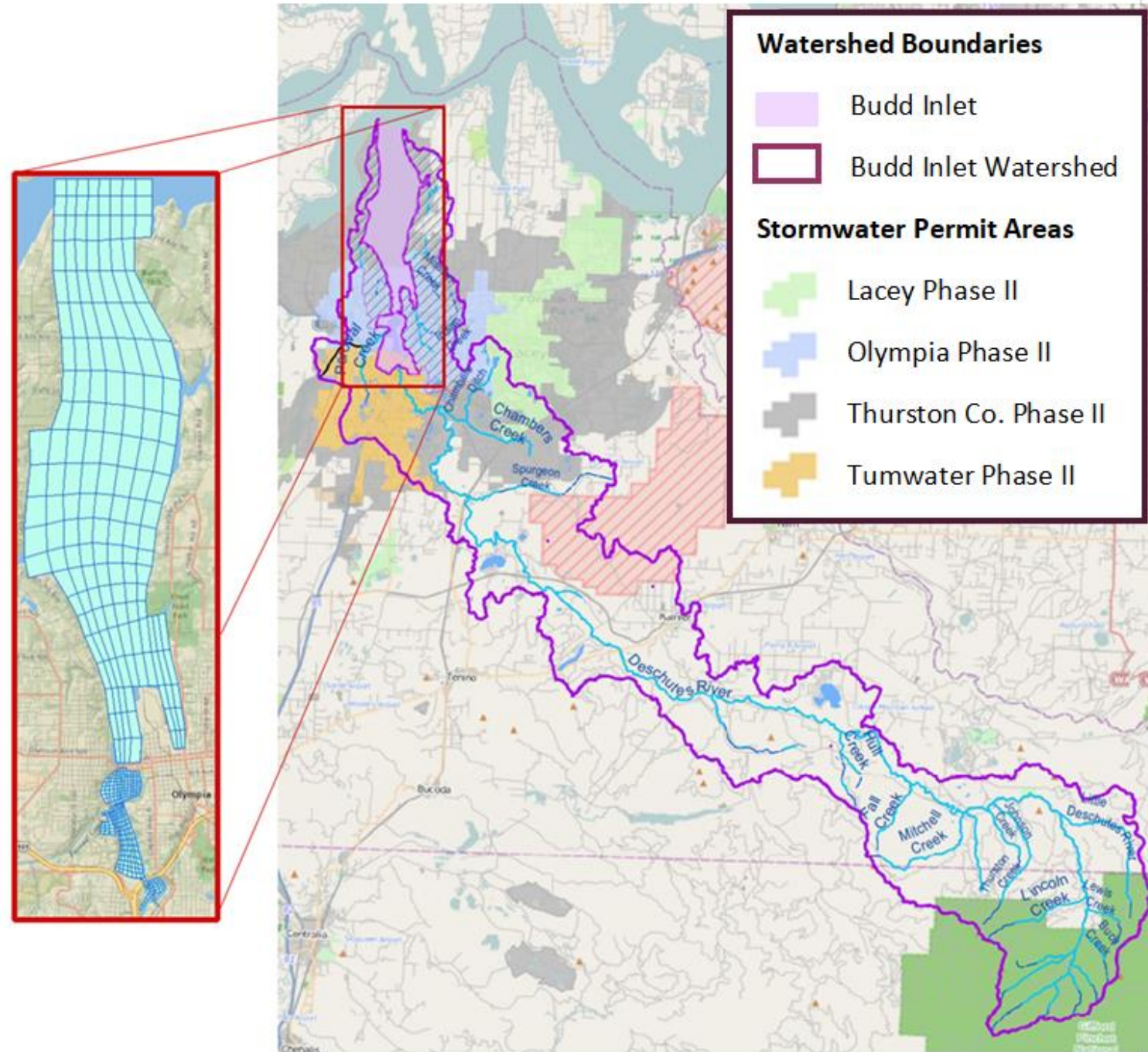
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- 3 *Recommendations and Next Steps*



How do we make our recommendations?

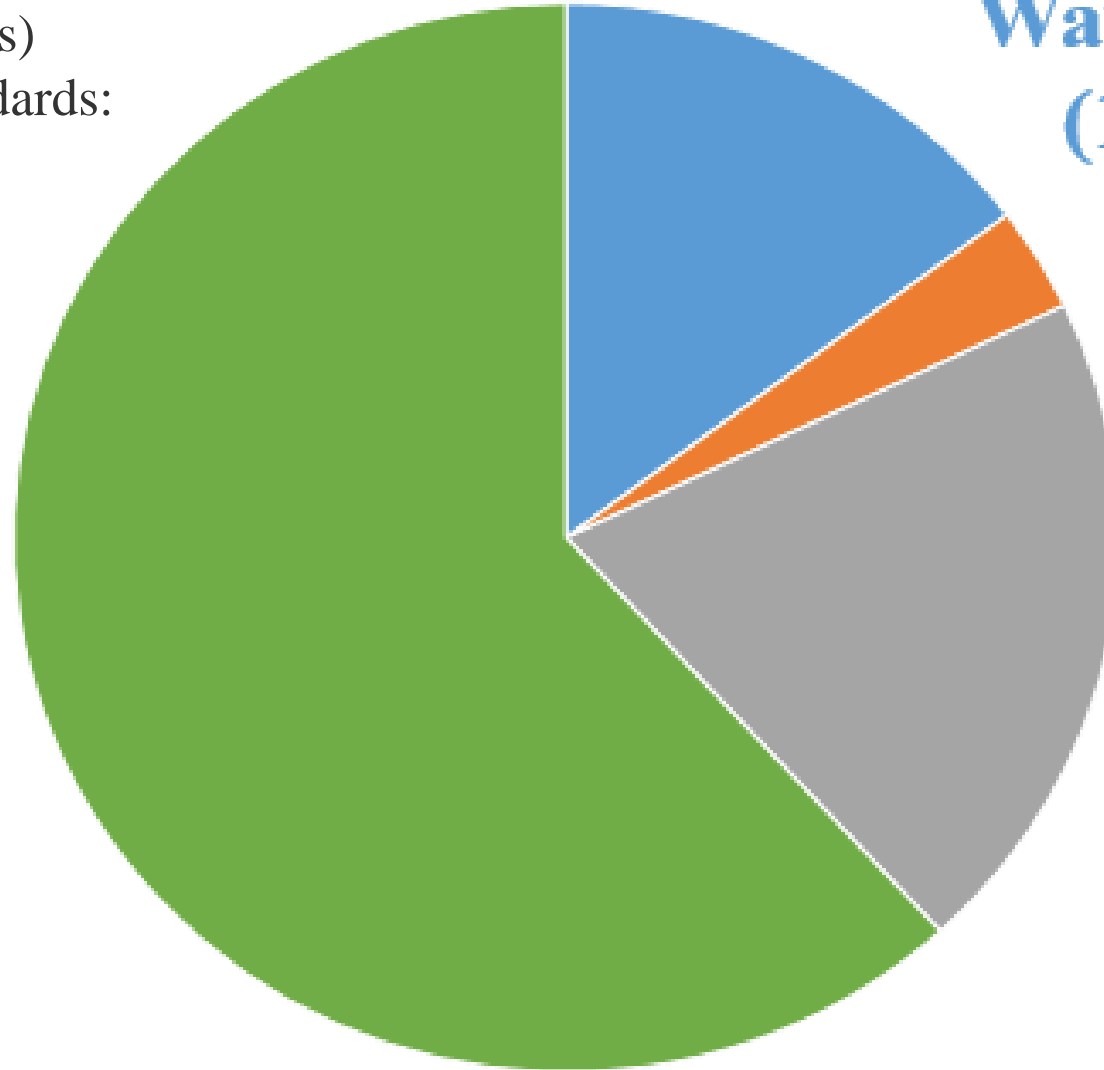
- Based on a combination of scientific modeling and stakeholder outreach
- At right, the geographical extent of the Budd Inlet model
- This model simulates the biology, chemistry, and physics of Budd Inlet
- The model has been reviewed internally, externally (by Dept. of Ecology-selected scientists), and independently (by experts chosen by EPA)



Sources of DO Depletion

Percent reductions (from 1997 loads)
required to meet water quality standards:

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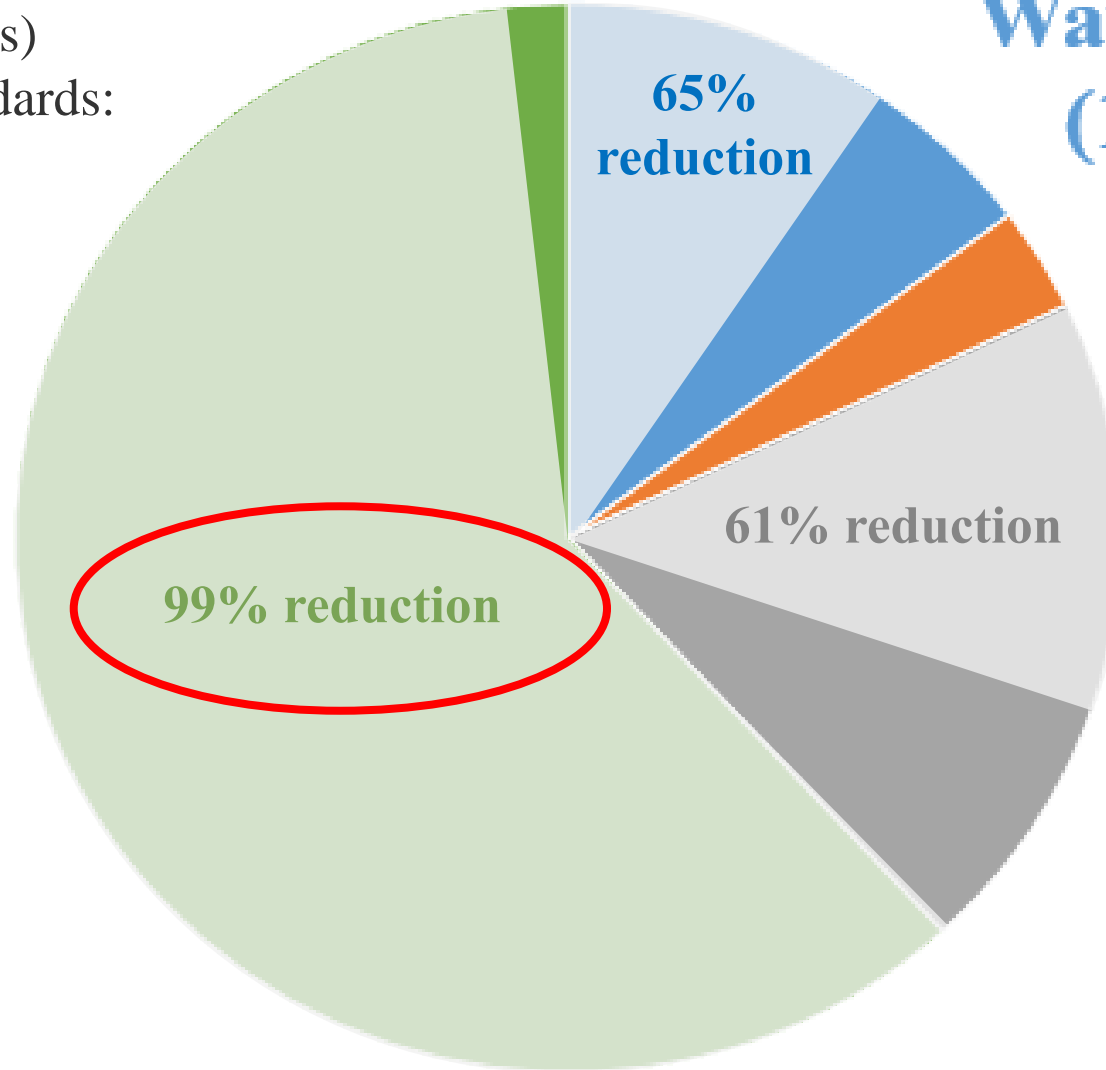
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LOTT
Reductions to permit
limits Aug-Oct; a cap on
limits in the future

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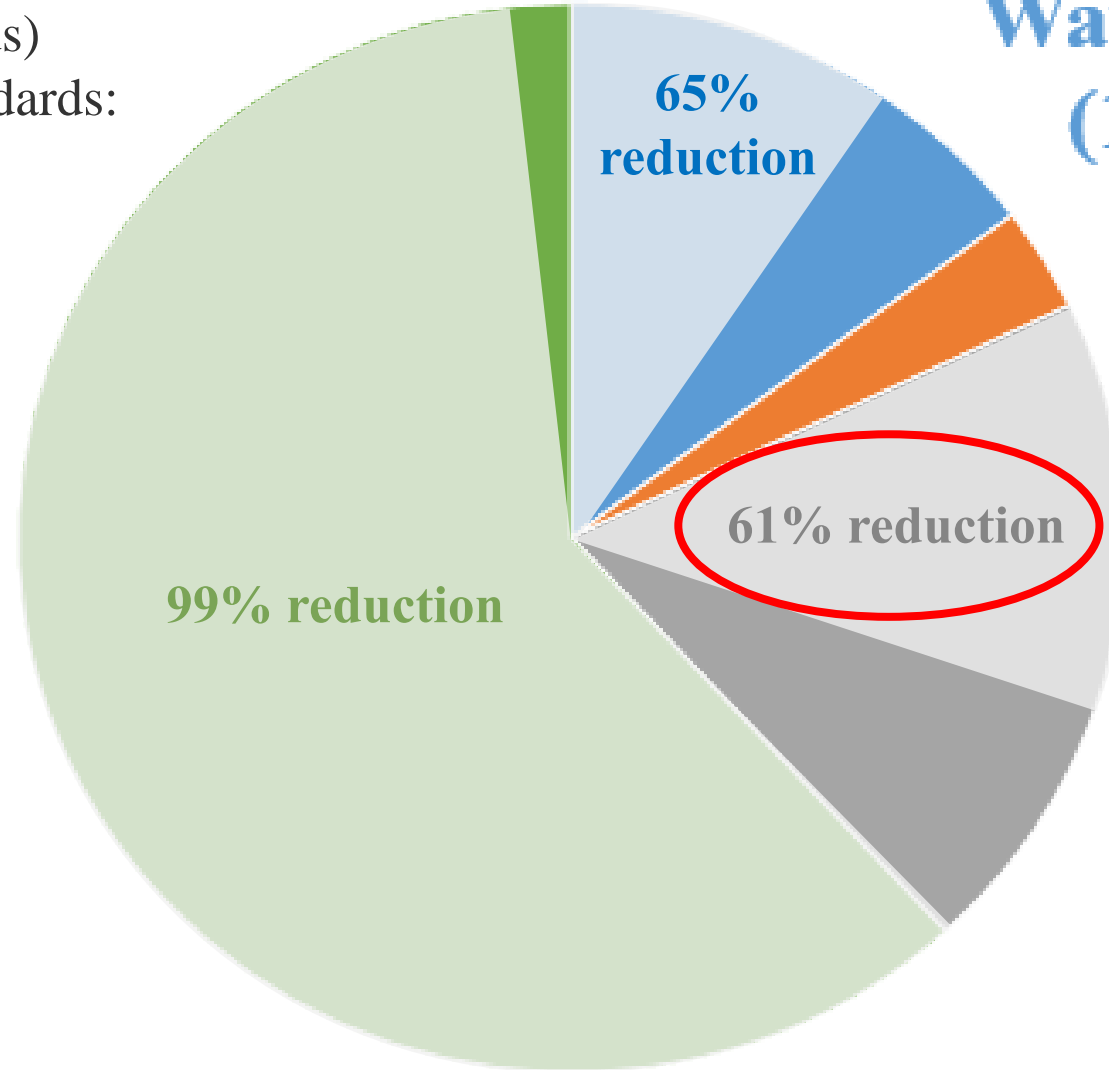
Capitol Lake

- The Department of Enterprise Services (DES) has identified their *Estuary Alternative* as the ‘likely preferred alternative’ to Capitol Lake management, allowing them to begin pursuing long-term project funding and governance.
- Ecology supports this solution. At present, the modeled management option shown to meet water quality standards is the restoration of Capitol Lake to an estuary.
- Capitol Lake is the most significant pollution allocation within the TMDL.
- DES’s Environmental Impact Statement will be released by *October 31, 2022*.

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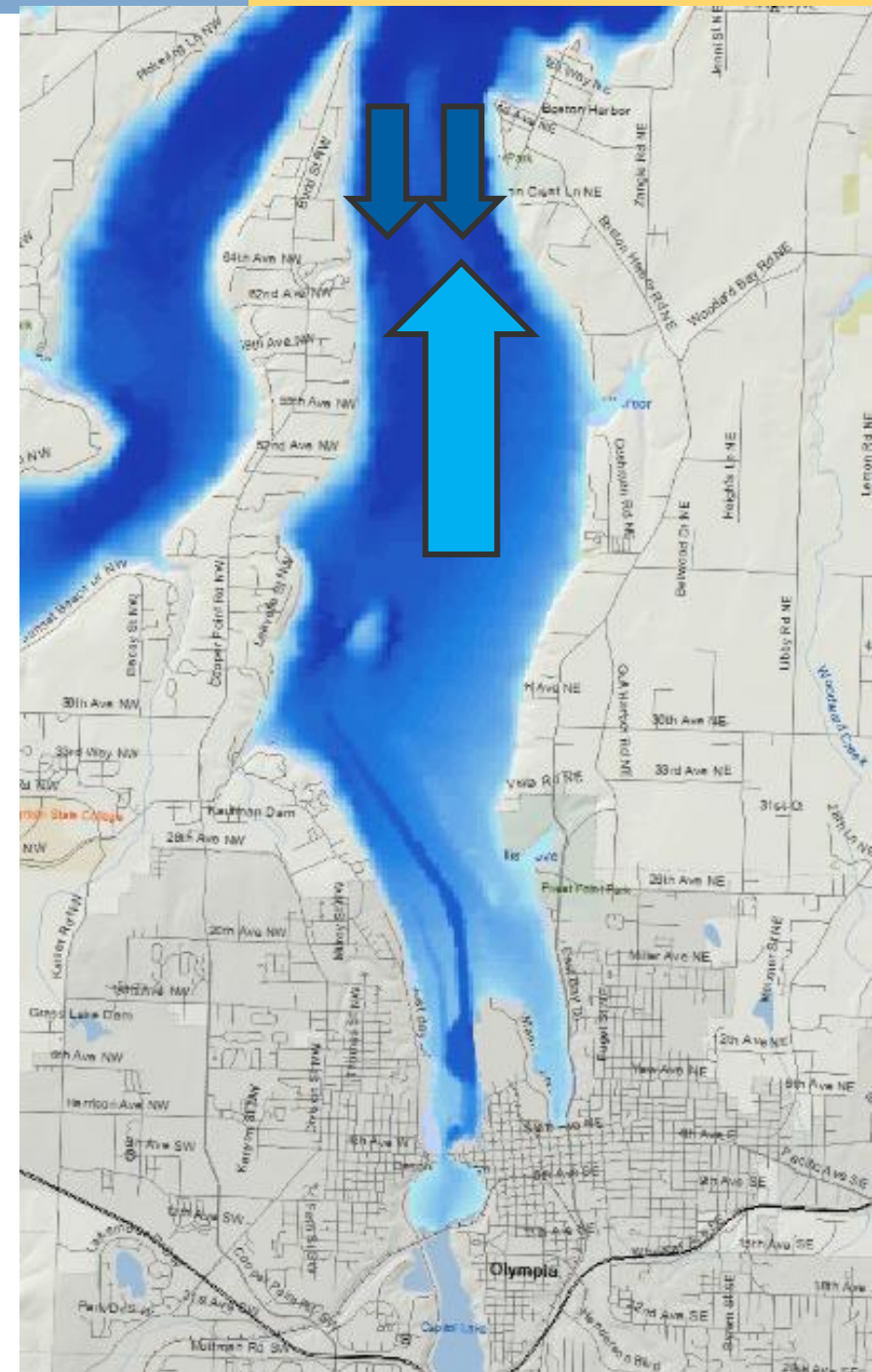
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Puget Sound

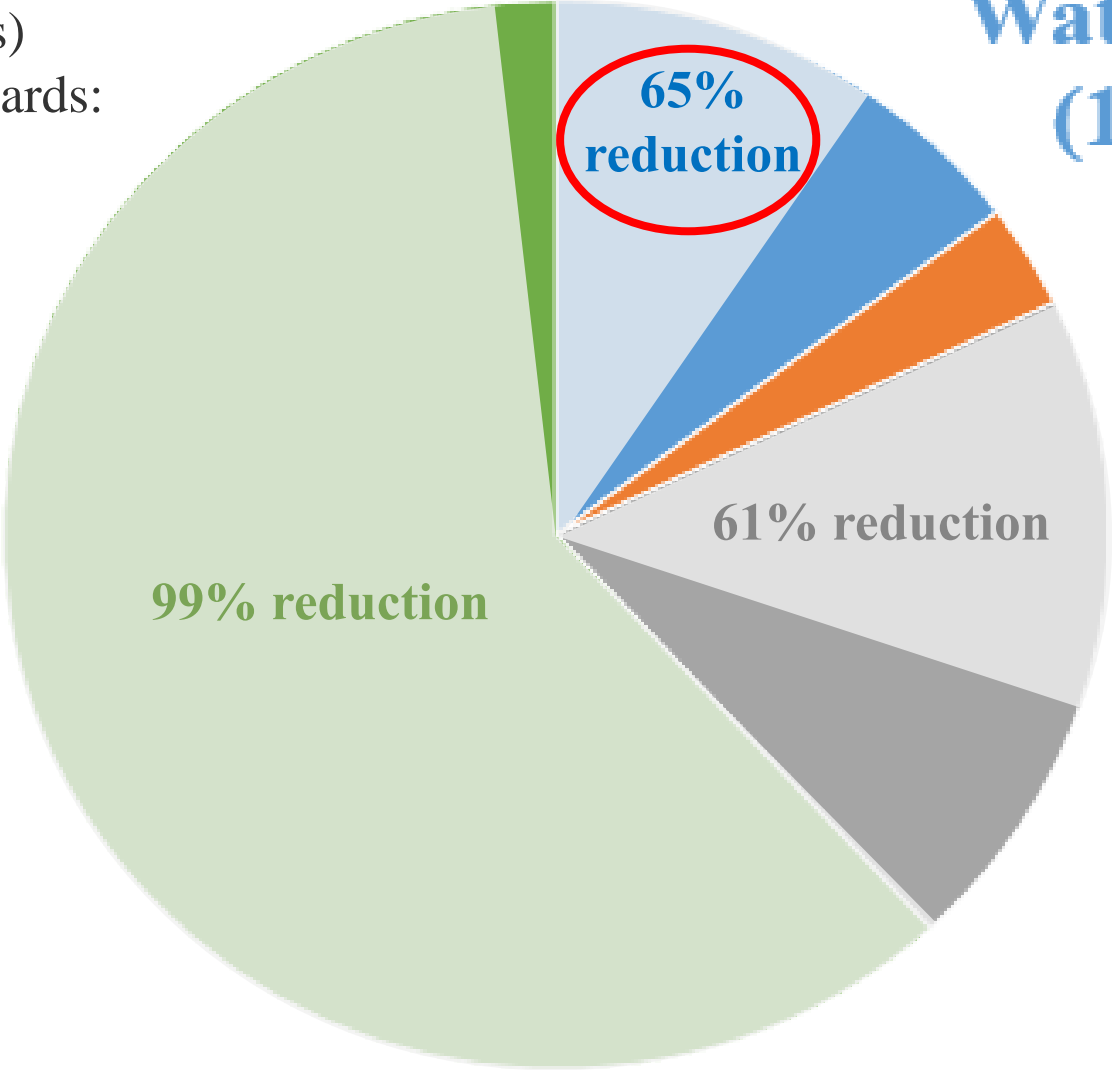
- While there is a net outward flow at the mouth of Budd Inlet, water moves in both directions
- The inward flow of water (mostly along the bottom of the inlet) transports nutrients as well
- This TMDL assigns an allocation to the influx of nutrients from Puget Sound, called the 'bubble allocation'
- The *Puget Sound Nutrient Source Reduction Project* and Nutrient General Permit are addressing nutrient pollution around the Greater Puget Sound watershed.
- The Budd Inlet TMDL relies upon the completion of PSNSRP, and vice versa.



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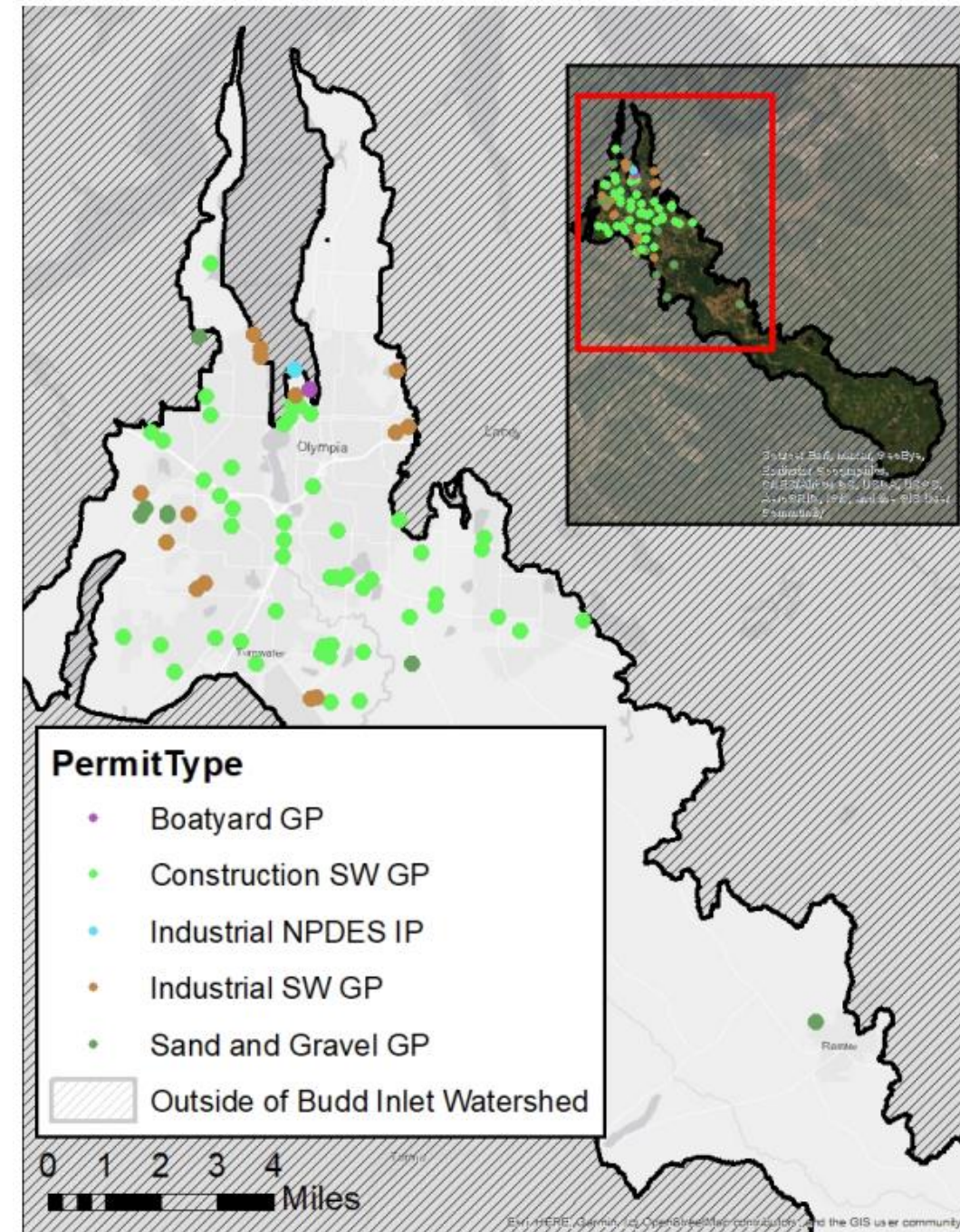
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Deschutes River

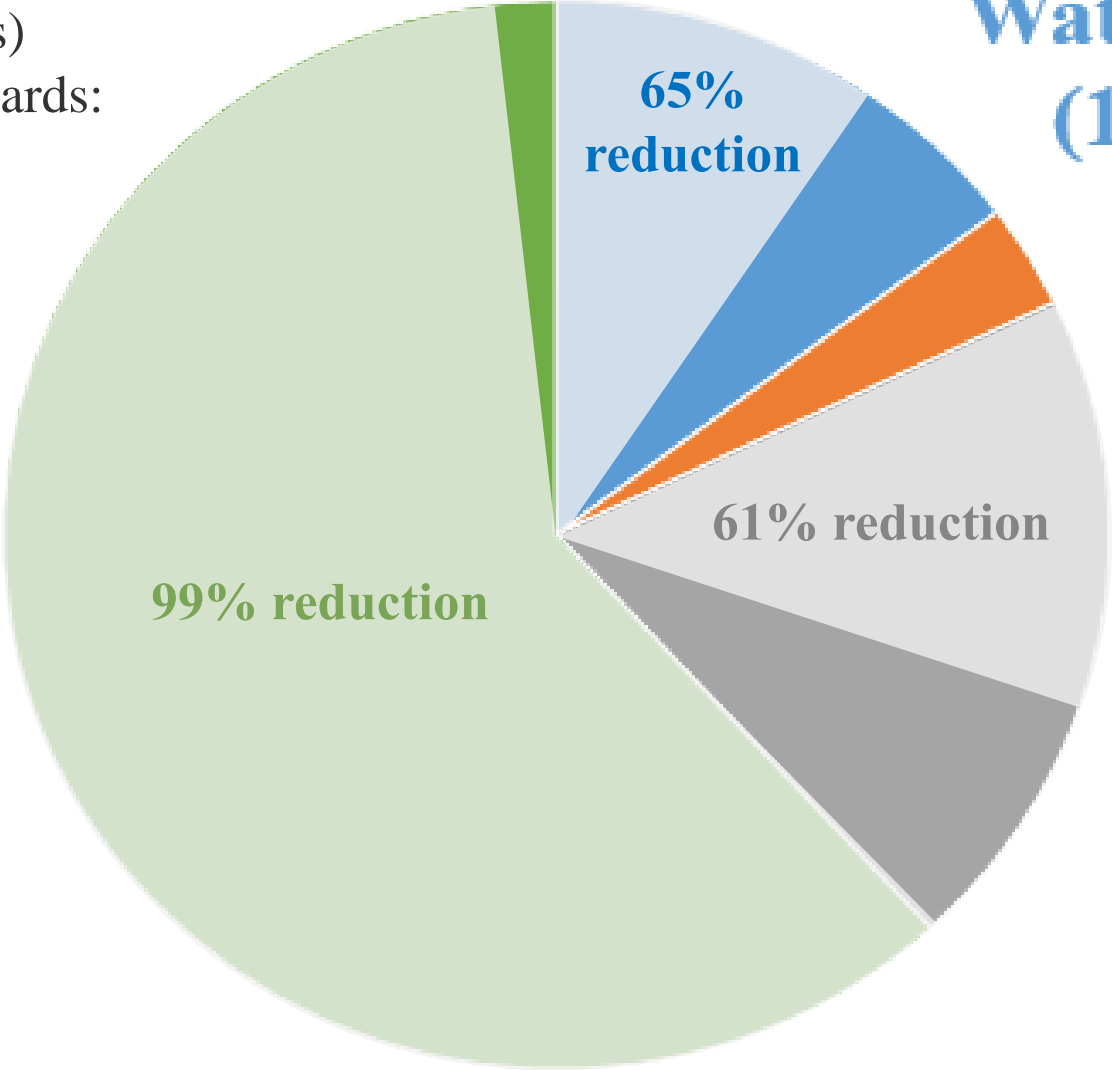
- This TMDL is consistent with the implementation plans associated with the Deschutes River TMDLs issued by EPA
- The TMDLs address temperature, bacteria, sediment, pH, and dissolved oxygen (DO)
- DO in Budd Inlet is a co-benefit.
- At right, permittees in the Deschutes and Budd Inlet watersheds that are assigned allocations by the Budd Inlet TMDL



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WWTPs

- Wastewater treatment plants constitute a small component of the overall loading capacity of Budd Inlet
- LOTT is the largest WWTP
- LOTT's nutrient allocations are made tighter during the critical period (Aug – Oct), and in the preceding months
- A cap has been placed on future discharge to Budd Inlet in the face of projected population growth in the region



How to Comment

- 1) With eComments (preferred)
 - Visit ecology.wa.gov/BuddInlet
 - Click on the eComments link
 - Let us know what you think!

- 2) By mail (postmarked by July 8)

Ben Watson

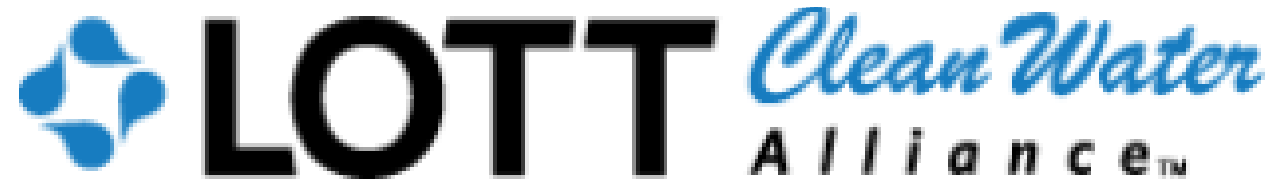
Washington State Department of Ecology

Water Quality Program

PO Box 47775

Olympia, WA 98504-7775

Who Are Ecology's Partners in Completing the Budd Inlet TMDL?





Thank you

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